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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 08/04/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/918,395

Applicant(s)

READE ET AL.

Examiner

Rodney G. McDonald

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-75 and 97-112 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17, 19-26, 28-48, 50-75 and 97-112 is/are rejected.
- 7) ☒ Claim(s) 18, 27 and 49 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6, 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed May 15, 2002 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. (It should be noted that U.S. Pat. 6,060,375 and U.S. Pat. 5,872,080 was considered because it was in the file)

Claim Objections

Claim 104 is objected to because of the following informalities:

Claim 104 is object to because the claim runs off the page and the phrase "ion beam" does not appear. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 6-17, 19-26, 28-33, 36-39, 41, 45-47, 51-57, 60, 64-68, 70 and 72 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasuhiro et al. (Japan 07-065642).

Yasuhiro et al. teach depositing a layer of cubic polycrystal thin *film* (*i.e. this is considered to be noncrystalline because applicant on page 14 considers noncrystalline*

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*form to include amorphous or nano-crystalline forms. The nano-crystalline form covers polycrystals of YSZ or MgO) such as YSZ (yttria stabilized zirconia), MgO and SrTiO₃. (See paragraph 0018, 0023, 0026 of machine translation) **(Compare to required noncrystalline surface of a cubic structure material of claims 1, 6, 7, 14, 22, 32, 37, 38, 39 required material chemically compatible with BaF₂ of claim 11, 31)** Figures 3 and Figures 5 show the ion texturing system with at least two ion beams. (See Figures 3 and 5) The YSZ is ion textured by irradiating the film with an ion beam with a 50-60 degrees incident angle at the base material to the normal of the membrane formation side of the base material supported by a base-material electrode holder. Two or more ion guns arranged at intervals of 90 degrees or 180 degrees at the circumference of the normal of the membrane formation side. (See paragraph 14 of machine translation) **(Compare to required at least two ion beams of Claim 1 with the required angles of claims 1, 2, 3, 8, 9, 22 and Compare to the apparatus of claims 97, 98, 105, 106)** The polycrystal of YSZ or MgO is textured such that the c axis of the crystallographic axis of each crystal grain is turned right-angled to the upper surface of a base material B, the a-axes and b-axes of a crystallographic axis of each crystal grain 20 are mutually turned in the same direction, and orientation within a field of it is carried out. Moreover, orientation of the c axis of each crystal grain 20 is carried out right-angled to the membrane formation (upper surface) side of a base material A. And the a-axes (or b-axis) of each crystal grain 20 make those angles (the grain boundary inclination K shown in Drawing 2) to be less than 30 degrees. (See paragraph 0023 of machine translation) *(i.e. this is considered to be biaxially texturing)**

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(Compare to biaxially texturing of claims 1, 22, 36) Although ion guns 13A and 13B have been arranged at intervals of 180 degrees on both sides of a base material A by not restricting the arrangement number of an ion gun to this, having at the angle of 90 degrees in addition to the ion guns 13A and 13B, as shown in drawing 5, and arranging ion gun 13C. Although three ion guns in all may all be arranged and it is not further shown by the drawing, you may arrange four ion guns every 90 degrees focusing on a base material A. (See paragraph 0035 of machine translation) **(Compare to the required two, three or four ion beams required by claims 19-21, 23-25 and Compare to the apparatus of claims 100-104 and 108-112)** In drawing 7 an oxide superconductivity layer C is deposited on a polycrystal thin film B (i.e. MgO or YSZ) while ion beam texturing. The oxide superconductors are yttrium based copper oxides. (See paragraph 0040) **(Compare to required superconductor materials of claims 10, 13, 30, 33 and Compare to the required 1st and 2nd layers with the 2nd being compatible with a third material. It should be noted that the claims 51 and 64 do not require the third material be disposed on the second material 51, 52, 53, 54, 55, 56, 57, 60, 64, 65, 66, 67, 68, 70, 72)** SrTiO₃ can be utilized. (See paragraph 0026 of machine translation) **(Compare to required SrTiO₃ of claim 11 and 12)** Claim 1 suggests irradiating while depositing with at least two ion beams. (See claim 1 machine translation) **(Compare to required simultaneously depositing cubic material and exposing the cubic material to at least one ion beam as required by claims 15, 16, 17, 26, 28, 29)** The lattice can have the <001> shafts. (See machine translation 0018) **(Compare to the required (001) plane of claim 41)** The substrate can be tape-like

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base material such as nickel alloys, silver, platinum, stainless steel, copper and a Hastalloy, etc. (paragraph 0022 of machine translation) In drawing 1 it is nontextured material. (see Drawing 1) ***(Compare to nontextured substrate of claims 45, 46)***

The method can be performed at 3×10^{-4} torr. (See machine translation paragraph 0048) ***(Compare to required pressure of claim 47)***

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-17, 19-26, 28-48 and 50-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuhiro et al. (Japan 07-065642) in view of Arendt et al. (U.S. Pat. 5,872,080).

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Yasuhiro et al. is discussed above and all is applies as discussed above.

Yasuhiro et al. further suggest selecting angles in the range of 50-60 degrees. (See Yasuhiro et al. discussed above)

The differences between Yasuhiro et al. and the present claims is that the temperature during deposition is not discussed, the ion flux is not discussed, the X-ray phi scan is not discussed, the critical current density is not discussed, the second material being ceria is not discussed, disposing the third material is not discussed, the time of exposure is not discussed and the texture roughness is not discussed.

Arendt et al. teach a superconducting article including a flexible polycrystal-line metal substrate, a layer of an adhesion layer material upon the surface of the flexible polycrystalline metal substrate, a layer of a cubic oxide material upon the adhesion layer material, the first layer of cubic oxide material deposited by ion beam assisted deposition, a layer of a buffer material upon the ion beam assisted deposited cubic oxide material layer, and a layer of YBCO upon the buffer material layer is provide and has demonstrated J_c of 1.3×10^6 A/cm². (See Abstract)

The ion beam assisted deposition of YSZ is conducted with substrate temperatures of generally 20 to 250 degrees. (Column 3 lines 19-21)

Still another aspect of the present invention is the use of an intermediate layer between the YSZ layer deposited by the IBAD process and the superconducting YBCO layer. This intermediate layer serves as a buffer layer between the YSZ layer and the YBCO and assists in lattice matching. This so-called "buffer layer" should have good "structural compatibility" between the YSZ or other cubic oxide material deposited in the

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IBAD process and the YBCO and should have good chemical compatibility with both adjacent layers. (Column 4 lines 60-68; Column 5 lines 1-2)

Among the materials suitable as this intermediate buffer layer are cerium oxide, yttrium oxide and other cubic oxide materials. (Column 5 lines 7-10)

The ion assist gun voltage and current density were about 250 eV and 150 microAmperes/cm² respectively. (Column 6 lines 1-3)

Light ions in the ion beam assisted deposition improve crystallinity and texturing. (Column 6 lines 10-12)

The delta phi can be up to about only 6 degrees. (Column 6 lines 20-22)

As to the time of exposure since the ion beam treats the film during deposition is the beam treatment must last more than 10 seconds since the film is deposited at a thickness of 100 to 10,000 Angstroms, preferably about 5,000 to 7,000 Angstroms. (Column 3 lines 21-23)

As to the texture roughness texturing by the IBAD process is recognized (Column 5 lines 30-34) by Arendt et al. and since the conditions for the IBAD process are similar it is believed that this would achieve Applicant's desired texture roughness as well as the root mean square roughness. (See Arendt et al. discussed above)

The motivation for selecting the temperature during deposition, selecting the ion flux, selecting the X-ray phi scan, selecting the critical current density, selecting the second material to be ceria, to dispose the third material, selecting the time of exposure and to select the texture roughness is that it allows for improving the properties of the YBCO film on a substrate. (Column 1 lines 61-63)

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made modified Yasuhiro by selecting the temperature during deposition, selecting the ion flux, selecting the X-ray phi scan, selecting the critical current density, selecting the second material to be ceria, disposing the third material, selecting the time of exposure and selecting the texture roughness as taught by Arendt et al. because it allows for improving the properties of the YBCO film on a substrate.

Allowable Subject Matter

Claims 18, 27 and 49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 18 and 27 are indicated as being allowable over the prior art because the prior art does not teach impinging the two ion beams on the noncrystalline surface in sequence.

Claim 49 is indicated as being allowable over the prior art because the prior art does not teach after initial ion exposure, decreasing the temperature while the exposing the surface to ions.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M- Th with Every other Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 703-308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9310 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
July 30, 2003